CLAIMS

WHAT IS CLAIMED IS:

1. An apparatus for measuring a load applied to a quantity of material, said apparatus comprising:

an inner plate having an inner surface and an outer surface, said inner surface of said inner plate being positionable against a portion of the quantity of material;

an outer plate having an inner surface and an outer surface, said outer plate being spaced apart from said inner plate such that said inner surface of said outer plate is opposite said outer surface of said inner plate; and

a load cell assembly positioned between said outer surface of said inner plate and said inner surface of said outer plate, such that said load cell assembly measures the load applied to the quantity of material when a force is exerted against the outer surface of said outer plate.

2. An apparatus according to claim 1, wherein said load cell assembly includes at least three load cells, wherein the load cells are substantially evenly spaced apart.

3. A gyratory compactor comprising:

a frame;

a mold supported by said frame, said mold having a cavity for receiving a quantity of material;

an inner plate being positionable against a portion of the material;

an outer plate which is spaced apart from said inner plate;

a load cell assembly positioned between said inner plate and said outer plate for measuring a load;

a ram which is engageable with said outer plate and which is for compacting the material within said mold; and

a mold gyrator for gyrating said mold as said ram compacts the material, such that said load cell assembly measures the load applied to the material when said ram exerts a force against said outer plate.

4. An apparatus according to claim 3, wherein said load cell assembly includes at least three load cells, wherein the load cells are substantially evenly spaced apart.

5. An apparatus according to claim 3, wherein said mold is a cylindrical mold, and wherein said inner plate is circular and has a first diameter and said outer plate is circular and has a second diameter which is slightly smaller than said first diameter.

6. An apparatus according to claim 3, wherein said outer plate is substantially prevented from sliding with respect to said ram when said mold gyrator gyrates said mold as said ram compacts the material.

7. An apparatus according to claim 6, wherein said ram includes a planar surface which abuts said outer surface of said outer plate when said ram compacts the material, wherein said outer surface of said outer plate includes a recess, and wherein said apparatus further includes:

a projecting member which extends from said planar surface of said ram into said recess of said outer plate such that said projecting member is engageable with sides of said recess.

8. An apparatus according to claim 3, further comprising:

a data acquisition system which is electrically coupled to said load cell assembly to record the load measurements taken by said load cell assembly; and

a microprocessor which is electrically coupled to said data acquisition system and/or said gyratory compactor to process and manipulate the recorded load measurements and volumetric properties.

9. An apparatus according to claim 8, wherein said second plate includes a hole therethrough to receive electrical wires connecting said data acquisition system to said load cell assembly.

10. A gyratory compactor comprising:

a frame;

a cylindrical mold supported by said frame, said mold having a cavity for receiving a paving material specimen;

a circular inner plate having a first diameter, said inner plate being positionable against the specimen;

a circular outer plate having a second diameter which is slightly smaller than said first diameter, said outer plate being spaced apart from said inner plate;

a load cell assembly positioned between said inner plate and said outer plate for measuring a load, said load cell assembly having at least three load cells which are substantially evenly spaced apart;

a ram which is engageable with said outer plate and which is for compacting the specimen within said mold;

a mold gyrator for gyrating said mold as said ram compacts the specimen, such that said load cell assembly measures the load applied to the specimen when said ram exerts a force against said outer plate, and such that said outer plate is substantially prevented from sliding with respect to said ram when said mold gyrator gyrates said mold as said ram compacts the specimen;

a data acquisition system which is electrically coupled to said load cell assembly to record the load measurements taken by said load cell assembly; and

a microprocessor which is electrically coupled to said data acquisition system to interpret the recorded load measurements.

11. A method of testing a paving material specimen for a particular performance variable, said method comprising:

subjecting the specimen to a compacting and gyrating process;

measuring load forces applied to the specimen in a plurality of predetermined locations during the compacting and gyrating process, the load forces creating a combined resultant force;

calculating a location of the resultant force based at least in part on the measured load forces; and

using the location of the resultant force as an evaluator of the performance variable.

12. A method according to claim 11, wherein using the location of the resultant force as an evaluator of the performance variable includes using the resultant force as an indicator of distortion resistance of the specimen.

13. A method according to claim 11, wherein using the location of the resultant force as an evaluator of the performance variable includes plotting the location of the resultant force as a function of gyrations.

14. A method according to claim 11, wherein measuring load forces applied to the specimen includes measuring the load applied to the specimen in at least three different locations during each gyration of the compacting and gyrating process.

15. A method according to claim 14, wherein measuring load forces applied to the specimen further includes taking at least fifty measurements at each location for each gyration.

16. A method according to claim 11, further comprising:
measuring height of the specimen during the compacting and gyrating process.

17. A method of evaluating a paving material specimen for predicting whether a related paving material mixture is suitable for actual use, said method comprising:

subjecting the specimen to a compacting and gyrating process;

measuring load forces applied to the specimen in a plurality of predetermined locations during the compacting and gyrating process, the load forces creating a combined resultant force;

calculating a location of the resultant force based at least in part on the measured load forces;

calculating shear resistance of the specimen based at least in part on the resultant force and the location of the resultant force; and

using the calculated shear resistance of the specimen as an evaluator of potential performance for the related paving material mixture.

18. A method according to claim 17, further comprising:

continuously determining the shear resistance of the specimen during the compacting and gyrating process.

19. A method according to claim 17, wherein using the calculated shear resistance of the specimen an evaluator of potential performance for the related paving material mixture includes plotting the frictional resistance as a function of gyrations.

20. A method according to claim 17, further comprising:

measuring a percentage of air voids in the specimen during the compacting and gyrating process; and

plotting the percentage of air voids and the frictional resistance of the specimen as a function of gyrations.